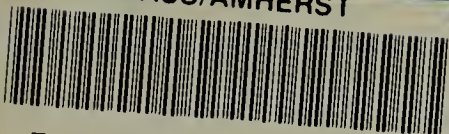


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Division of Air Quality Control

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

DIVISION OF AIR QUALITY CONTROL

1983

AIR QUALITY DATA REPORT

ONE WINTER STREET - 8TH FLOOR
BOSTON, MASSACHUSETTS 02108

PERMANENT DOCUMENT
COLLECTION

NOV 24 1986

State of Massachusetts
Department of Environmental Quality Engineering

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I. INTRODUCTION

This report presents 1983 annual air quality data for Massachusetts collected by the Division of Air Quality Control (DAQC), Department of Environmental Quality Engineering (DEQE). Data is collected by the Commonwealth and submitted to the U.S. Environmental Protection Agency (EPA) for inclusion into the National Aeromatic Data Bank in accordance with Regulations 40 CFR 58. DAQC has primary responsibility for measuring ambient air quality to verify compliance with state and national standards (see Table 1) to support development of regulations designed to reduce ambient air contaminants, to assess the effectiveness of existing air pollution control strategies, and to fulfill EPA reporting requirements for air quality data.

The continuous air monitoring stations are located in a variety of areas within Massachusetts, both urban and rural. The stations are equipped with air pollution monitoring equipment (see Table 3) and, in some cases, meteorological equipment. The state air pollution monitors record levels of ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, nitrogen oxide, oxides of nitrogen, total suspended particulates, and lead. Meteorological parameters measured in most instances include wind speed, wind direction, and temperature.

The Commonwealth's ambient air monitoring network is complemented by a private network of monitors. This private network is limited to sulfur dioxide, windspeed, wind direction, sulfate and total suspended particulate monitoring.

TABLE 1

STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS					
POLLUTANT	AVERAGING INTERVAL	PRIMARY STANDARD		SECONDARY STANDARD	
		ug/m ³	ppm	ug/m ³	ppm
Sulfur Dioxide	Annually	80	0.03	-	-
	24 hour	365	0.14	-	-
	3 hour	-	-	1,300	0.5
Particulate Matter	Annually	75	-	60**	-
	24 hour	260	-	150	-
Carbon Monoxide	8 hour	10*	9	10*	9
	1 hour	40*	35	40*	35
Ozone	1 hour	240	0.12	240	0.12
Nitrogen Dioxide	Annually	100	0.05	100	0.05
Lead	3 month	1.5	-	1.5	-

ug/m³ - micrograms per cubic meter
 ppm - parts per million

*mg/m³ - milligram per cubic meter

** annual average is considered a guideline

TABLE 2
HEALTH AND WELFARE EFFECTS OF AIR POLLUTANTS

POLLUTANTS AND THEIR SOURCES	HEALTH EFFECTS	WELFARE EFFECTS
<u>Ozone</u> Product of reactions of motor vehicle exhaust, industrial process emissions and other fossil fuel combustion emissions in the presence of sunlight.	Causes difficulty in breathing, especially when exercising, irritates eyes, may result in an increased susceptibility to respiratory infection.	Toxic to plants by causing both leaf damage and a decrease in growth. Can weaken materials such as rubber and fabrics.
<u>Total Suspended Particulates</u> Fossil fuel burning, industrial process emissions, motor vehicle exhaust, traffic movement over dusty roads.	Cause further distress to those with chronic lung diseases, can alter the lungs' natural cleansing mechanism and can either be composed of or have toxic materials adhered to the surface.	Cause soiling of materials, are corrosive and can damage buildings. In addition, causes haze which reduces visibility and the amount of solar energy reaching the earth.
<u>Carbon Monoxide</u> Internal combustion engines, fossil fuel combustion, and cigarette smoking.	Reduces the blood's ability to carry oxygen which may cause heart and brain damage. Causes a decreased exercise capacity in those with angina pectoris. Also can cause slowed physical reactions, dizziness, fatigue, and headache.	No known effect on materials or vegetation.
<u>Sulfur Dioxide</u> Combustion of fossil fuel.	Irritation of throat and lungs and aggravation of symptoms among those with chronic lung diseases.	Corrosion and deterioration of metals, brittleness of paper, discoloration of paint and deterioration of fabric. Causes leaf damage to some plants.
<u>Nitrogen Dioxide</u> Emitted from motor vehicles and fossil fuel burning operations such as power plants.	Aggravation of symptoms in those with asthma and chronic bronchitis and increased susceptibility to respiratory infections	Fading of dyes, yellowing of leaves on plants, and changing the horizon to a reddish brown color.

TABLE 3

ANALYSIS COLLECTION METHOD LISTING*

Sulfur Dioxide:

- 14 Coulometric
- 20 Pulse Fluorescent Instrumental

Carbon Monoxide:

- 11 Non-Dispersive Infra-Red Instrumental
- 14 Ultraviolet Photometric

Ozone:

- 11 Chemiluminescence Instrumental

Nitrogen Dioxide:

- 14 Chemiluminescence Instrumental

Total Suspended Particulates:

- 92 High Volume Air Sampler

Lead:

- 92 High Volume Air Sampler

* Corresponds To Data Summary: Instrument Method

Figures 2, 3, 4, 5, and 6 present the Commonwealth's monitoring network maintained by DAQC in 1983 for each of the six pollutants. This year the Division collected a total of 488,939 hourly samples at the state-operated sites and 683,464 hourly samples at the privately-operated sites, which included wind speed and direction, temperature, oxides of nitrogen and sulfates, making a total of 1,172,403 (see Figure 1). This total represents an increase of 67,749 hourly samples over those collected in 1982 because of an increase in data capture. The Commonwealth data has been summarized in this report for public record for information purposes. Violations of air quality standards were recorded for ozone and carbon monoxide, both for the one-hour and eight-hour averages (see Table 4). For further information pertaining to this report or other air quality-related matters, please contact either the Division of Air Quality Control in Boston at (617) 292-5630 or the appropriate Regional Office.

AIR QUALITY SECTION CHIEFS

REGION 1 (Western)

John Higgins, REE

Stephen Joyce, DREE

David Howland, Chief-AQC

436 Dwight St.

Springfield, MA 01101

(413) 785-5327

REGION 2 (Central)

Gilbert Joly, REE

Edmond Benoit, DREE

Thomas Cusson, Chief-AQC

75 Grove St.

Worcester, MA 01605

(617) 791-3672

REGION 3 (Metropolitan/Northeast)

William St. Hilaire, REE

Richard Chaplin, DREE

Michael Maher, Chief-AQC

5 Commonwealth St.

Woburn, MA 01801

(617) 935-2160

REGION 4 (Southeast)

Paul Anderson, REE

Robert Donovan, DREE

Vaughan Steeves, Chief-AQC

Lakeville Hospital

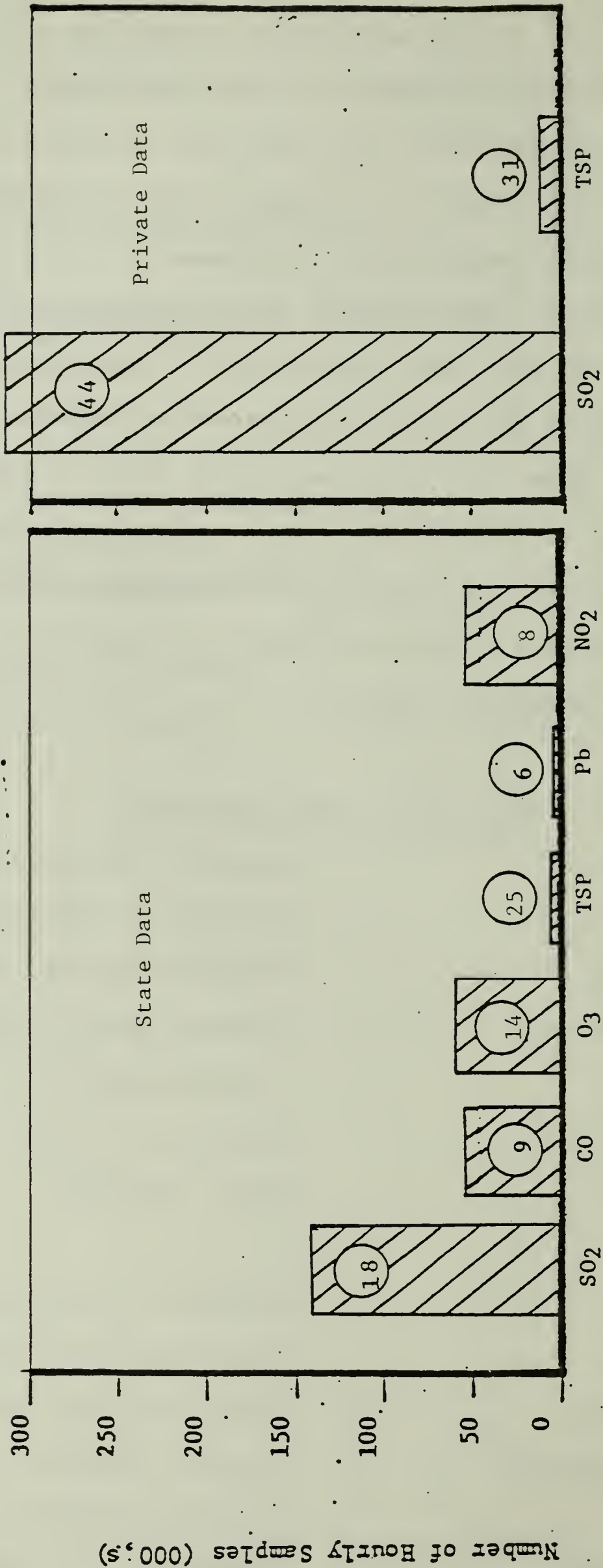
Lakeville, MA 02346

(617) 947-1231

FIGURE 1
Continuous Air Sampling Network

-1983-

*GRAND TOTAL = 649,530



KEY

(xx) = Number of Sites

TSP = Total Suspended Particulates

SO₂ = Sulfur Dioxide

O₃ = Ozone

CO = Carbon Monoxide

Pb = Lead

NO₂ = Nitrogen Dioxide

TABLE 4

POLLUTANT	LOCATION	AQCR	ADDRESS	SAROAD	MO.	DAY	TIME	LEVEL REACHED
SULFUR DIOXIDE (SO ₂) (Annual)	NO EXCEEDANCES		RECORDED					
CARBON MONOXIDE (Eight Hour Average)	Boston	Metro Boston (119)	Kenmore Square	0240-002	Jan	30	0100	15 mg/M ³
						30	1800	10 mg/M ³
	Springfield	Pioneer E. Columbus Ave. Valley (042)		2160-007	Feb	14	1500	10 mg/M ³
						15	0000	14 mg/M ³
One Hour Averages	NO EXCEEDANCES		RECORDED					
NITROGEN DIOXIDE (Annual)	NO EXCEEDANCES		RECORDED					
LEAD (Quarterly)	NO EXCEEDANCES		RECORDED					
TSP (Annual)	NO EXCEEDANCES		RECORDED					
24 Hour Average (Primary)	NO EXCEEDANCES		RECORDED					

TABLE 4 (Cont.)

POLLUTANT	LOCATION	AQCR	ADDRESS	SAROAD #	MO.	DAY	TIME	LEVEL REACHED
OZONE (O ₃)	Agawam	Pioneer Valley (042)	So. Westfield St.	0030-003	April	28	1700	.175 ppm
					June	27	1400	.128 ppm
					June	30	1600	.160 ppm
					July	02	1800	.125 ppm
					July	03	1600	.145 ppm
					July	04	1700	.225 ppm
					July	12	1400	.150 ppm
					July	28	1600	.165 ppm
					July	29	1600	.185 ppm
					July	31	1400	.145 ppm
					Aug.	08	2000	.145 ppm
					Aug.	17	1800	.175 ppm
					Aug.	26	1600	.125 ppm
					Sept	06	1800	.140 ppm
					Sept	20	1600	.145 ppm
	Amherst	Pioneer Valley (042)	Solar Habitat	0060-002	June	17	1400	.140 ppm
					June	30	1800	.135 ppm
					July	04	1700	.147 ppm
					July	28	1300	.145 ppm
					July	29	1700	.145 ppm
					Aug.	17	2000	.145 ppm
					Aug.	26	1800	.157 ppm
					Sept	20	1900	.160 ppm
	Chicopee	Pioneer Valley (042)	Anderson Road	0400-008	April	28	1700	.170 ppm
					June	04	1300	.160 ppm
					June	05	1400	.157 ppm
					June	06	1200	.125 ppm
					June	07	1500	.127 ppm
					June	30	1800	.135 ppm
					July	04	1700	.185 ppm
					July	28	1200	.125 ppm

TABLE 4 (Cont.)

Pollutant	Location	AQCR	Address	SAROAD #	Mo	Day	Time	Level Reached
	Pepperell	Central Mass (118)	12 Bennett Street	1792-001	July	29	1800	.142 ppm
	Worcester	Central Mass (118)	DPW Yard	2640-019	June Aug. Aug.	15 17 26	1200 2000 1700	.132 ppm .125 ppm .145 ppm
	Lawrence	Merrimack Valley (121)	High Street	1000-005	June July	14 04	1400 1200	.129 ppm .127 ppm
	Newburyport	Merrimack Valley (121)	Plum Island	1520-003	July	15	1600	.131 ppm
	Pittsfield	Berkshire (117)	Birch Grove Drive	1800-007	April July	28 28	1900 1900	.135 ppm .180 ppm
	Medfield	Met. Boston State Hospital (119)		1210-001	June June July Aug. Aug. Sept.	14 15 02 17 26 06	1500 1200 1800 2000 1600 1700	.192 ppm .177 ppm .133 ppm .131 ppm .136 ppm .149 ppm

TABLE 4 (Cont.)

POLLUTANT	LOCATION	AQCR	ADDRESS	SAROAD #	MO.	DAY	TIME	LEVEL REACHED
OZONE (03)	Ware	Pioneer Valley (042)	Ware High School	2360-001	April	28	1900	.150 ppm
					June	15	1400	.125 ppm
					June	17	1500	.125 ppm
					June	30	1800	.135 ppm
					July	29	1500	.172 ppm
					Sept	20	1500	.125 ppm
<hr/>								
	Attleboro	Southeast Mass (120)	532 Newport Ave.	0120-004	July	12	1900	.133 ppm
					<hr/>			
	Easton	Southeast Mass (120)	Post Office	0535-001	June	15	1100	.126 ppm
					<hr/>			
	Fairhaven	Southeast Mass (120)	Leroy Wood School	0570-002	July	04	1100	.137 ppm
					June	13	1200	.148 ppm
					June	15	1400	.142 ppm
					June	19	1900	.129 ppm
					June	23	1700	.198 ppm
					June	24	1600	.158 ppm
					June	27	1400	.160 ppm
					June	30	1700	.126 ppm
					July	08	1500	.130 ppm
					July	15	1700	.155 ppm
					July	18	2000	.130 ppm
					July	20	1700	.146 ppm
					Sept	04	1500	.145 ppm
					Sept	05	1600	.142 ppm
					Sept	07	1300	.126 ppm

TABLE 4 (Cont.)

Pollutant	Location	AQCR	Address	SAROAD #	Mo	Day	Time	Level Reached
Ozone (03)	Sudbury	Met. Boston Watertown Road (119)		2196-001	June	14	1400	.162 ppm
					June	15	1400	.205 ppm
					June	17	1600	.143 ppm
					June	18	1400	.127 ppm
					July	12	1500	.129 ppm
					July	29	1400	.127 ppm
					Aug.	08	1700	.138 ppm
					Aug.	17	2000	.138 ppm
					Aug.	26	1700	.146 ppm
					Sept	06	1800	.142 ppm

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD		REC	STATION	POLLUTANTS					
		EAST		HGT	TYPE	SAMPLED					
		NORTH		(M)			SO ₂	CO	O ₃	NO ₂	TSP

BERKSHIRE AIR QUALITY CONTROL REGION (117)

Pittsfield Berkshire Commons (roof of Berk- shire Commons)	1800-006	<u>643500</u> 4699897	11	Center City Commercial						X	
Pittsfield Birchgrove Drive	1800-007	<u>646480</u> 4700620	3	Suburban- Commercial	X		X				

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Fitchburg Summer St. Sub- station (Fitchburg Gas & Electric Co.)	0620-003	<u>271500</u> 4716800	5	Center City- Industrial	X						
Fitchburg 655 Main St. (Fitchburg Gas & Electric Co.)	0620-006	<u>269900</u> 4718200	11	Center City- Commercial							
Gardner 95 Pleasant Street(City Hall)	0720-003	<u>254100</u> 4717700	11	Center City- Residential						X	

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD		REC. STATION HGT TYPE (M)	POLLUTANTS SAMPLED					
		EAST NORTH			SO ₂	CO	O ₃	NO ₂	TSP	Pb
Warren River St. (Quaboag Reg. School)	2372-001	<u>732000</u> 4677900	5	Rural- Agricultural					X	
Worcester 419 Belmont St.	2640-013	<u>272400</u> 4683700	5	Center City Residential					X	
Worcester 2 Washington St.	2640-016	<u>269100</u> 4682200	13	Center City- Commercial					X	X
Worcester Grove Street(Voc. Tech. Sch.)	2640-018	<u>269100</u> 4683750	10	Center City- Commercial					X	
Worcester Belmont Avenue (DPW Yard)	2640-019	<u>272300</u> 4683800	4	Center City Residential	X		X	X		
Worcester Thomas Street (Fire Station)	2640-020	<u>269200</u> 4683100	3	Center City- Commercial	X	X				

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
					SO ₂	CO	O ₃	NO ₂	TSP	Pb
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)										
Boston 590 Commonwealth Ave. (Kenmore Sq Site)	0240-002	<u>327100</u> 4690400	5	Center City- Commercial	X	X		X		X
Boston Southampton St. (Fire Hdqtrs.)	0240-012	<u>329580</u> 4688230	14	Center City- Commercial					X	
Boston Kneeland Street (State Parking Lot)	0240-015	<u>330000</u> 4690000	3	Center City-	X	X				
Boston 340 Breman St. (Substation)	0240-021	<u>333000</u> 4693550	3	Center City- Residential	X	X	X	X	X	
Boston Essex Street	0240-022	<u>330100</u> 4690750	3	Center City- Commercial		X				
Boston Morrissey Blvd. (Savin Hill Yacht Club)	0240-023	<u>331500</u> 4686950	5	Center City- Residential						
Boston 200 Columbus Ave. (Fire Station Rooftop	0240-024	<u>329400</u> 4690350	10	Center City- Commercial					X	
Boston Deer Island	0240-026	<u>337900</u> 4690200	4	Suburban- Residential	X			X		
Brockton Crescent Street	0320-003	<u>333300</u> 4660400	14	Center City- Industrial					X	
Chelsea Chestnut and Sixth Street	0380-002	<u>332500</u> 4695100	16	Center City- Commercial					X	X

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
					SO ₂	CO	O ₃	NO ₂	TSP	Pb
Easton Post Office, 300 Main Street North Easton	0535-001	<u>327050</u> 4659170	5	Rural- Near Urban			X			
Medfield North Meadow St. (Rt. 27, Medfield State Hospital)	1210-001	<u>307200</u> 4675800	24	Rural- Commercial	X		X		X	
Medford 100-120 Main St. (Fire Headqtrs.)	1220-002	<u>326300</u> 4697990	7	Center City- Commercial					X	
Quincy Hancock Street (Atlantic Fire Station)	1880-007	<u>332400</u> 4682100	3	Suburban- Residential					X	
Sudbury Water Town Road (Great Meadows Nat'l Wildlife Reserve)	2196-001	<u>303350</u> 4695100	5	Rural- Agricultural			X			
Watertown Victory Field	2380-005	<u>320310</u> 4693500	4	Center City- Residential	X					
Woburn Woburn St. & Montvale Ave. (Middlesex Cty. Court)	2620-002	<u>323000</u> 4705000	12	Suburban- Commercial					X	

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD		REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
		EAST				SO ₂	CO	O ₃	NO ₂	TSP	Po
		NORTH									
PIONEER VALLEY AIR QUALITY CONTROL REGION (042)											
Amnerst Solar Habitat	0060-002	704310 46960600	3	Rural- Agricultural				X			
Agawam Market Square (City Hall)	0030-003	692120 4659040	3	Rural- Agricultural				X			
Chicopee 939 Chicopee St.	0400-005	697900 4673400	4	Center City- Industrial	X	X					
Chicopee Anderson Rd. Westover	0400-008	701800 4674200	3	Suburban Commercial	X			X	X		
Holyoke 1 Court Square (Top of District Court House)	0860-007	697480 4674500	12	Center City- Commercial						X	
Springfield 1586 E. Columbus Avenue	2160-007	698000 4662000	7	Center City- Industrial		X					X
Springfield Longhill Avenue (Substation)	2160-009	700000 4661928	6	Center City- Commercial	X						
Springfield 59 Howard Street (Howard St. School)	2160-011	699460 4663380	19	Center City- Commercial						X	X
Springfield Fernbank Street	2160-014	707080 4668200	4	Suburban- Commercial		X	X				
Springfield Community/Tech. College	2160-015	700000 4664500	15	Center City- Residential	X			X	X		
Ware Route 32 (Ware High School)	2360-001	725850 4680900	4	Suburban- Commercial				X			
West Springfield Van Deene St. (Fire Dept.)	2475-003	696400 4663940	7	Suburban- Commercial						X	

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD EAST NORTH	REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
					SO ₂	CO	O ₃	NO ₂	TSP	Pb
MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)										
Lawrence 1 General St. (Lawrence General Hospital)	1000-003	<u>324000</u> 4730500	23	Center City- Commercial						X
Lawrence High Street (Storrow Park)	1000-005	<u>342220</u> 4730590	4	Center City- Residential	X		X	X	X	
Lowell 35 YMCA Drive	1080-006	<u>310370</u> 4722640	7	Center City- Commercial					X	X
Lowell Merrimack Street (Old City Hall)	1080-007	<u>310400</u> 4723800	5	Center City- Commercial	X	X				
Pepperell 12 Bennett St.	1792-001	<u>288854</u> 4726275	3	Suburban Residential			X			
Newburyport 234 Earle Street	1520-003	<u>351300</u> 4741600	4	Suburban Residential			X			

II. 1983 SITE DIRECTORY

CITY SITE LOCATION	SAROAD #	UTM COORD		REC HGT (M)	STATION TYPE	POLLUTANTS SAMPLED					
		EAST				SO ₂	CO	O ₃	NO ₂	TSP	Pb
		NORTH									

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION

Attleboro So. Main St. (Fire Station)	0120-002	311000 4644000	5	Center City- Residential						X	
Attleboro 532 Newport Ave.	0120-004	000000 0000000	13	Suburban- Residential			X				
Fairhaven Leroy Wood School	0570-002	343300 4610800	4	Suburban- Residential	X		X	X			
Fall River 165 Bedford St. (Central Fire Station)	0580-001	321000 4618000	15	Center City- Commercial						X	
Fall River Globe Street	0580-004	319700 4616900	5	Center City- Commercial	X						
Taunton 88 Washington St. (Morton Hospital)	2240-001	326400 4641200	20	Center City- Commercial						X	

III. SAMPLING RESULTS FOR CONTINUOUS DATA

A. Sulfur Dioxide

1. Sampling Method

The instrumental method used to analyze continuous sulfur dioxide concentrations was pulse fluorescent. In the pulse fluorescent method, SO₂ molecules are excited by ultra-violet light. In the process, the molecules emit distinctive light waves which vary in intensity according to the SO₂ concentration. The intensity is then measured to find specific SO₂ concentrations. The Sampling method meet the equivalency requirements published by the U.S. Environmental Protection Agency (EPA) in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

In 1983, there were 18 state-operated SO₂ monitors--a decrease of four monitors from 1982. Sixteen of these sites operated in 1983 at 75% or greater for data capture. There were no recorded violations of the National Ambient Air Quality Standards (NAAQS) for SO₂ in 1983. Table 5 shows that the highest annual average is in the Metropolitan Boston urban area.

TABLE 5

1983 SULFUR DIOXIDE SUMMARY

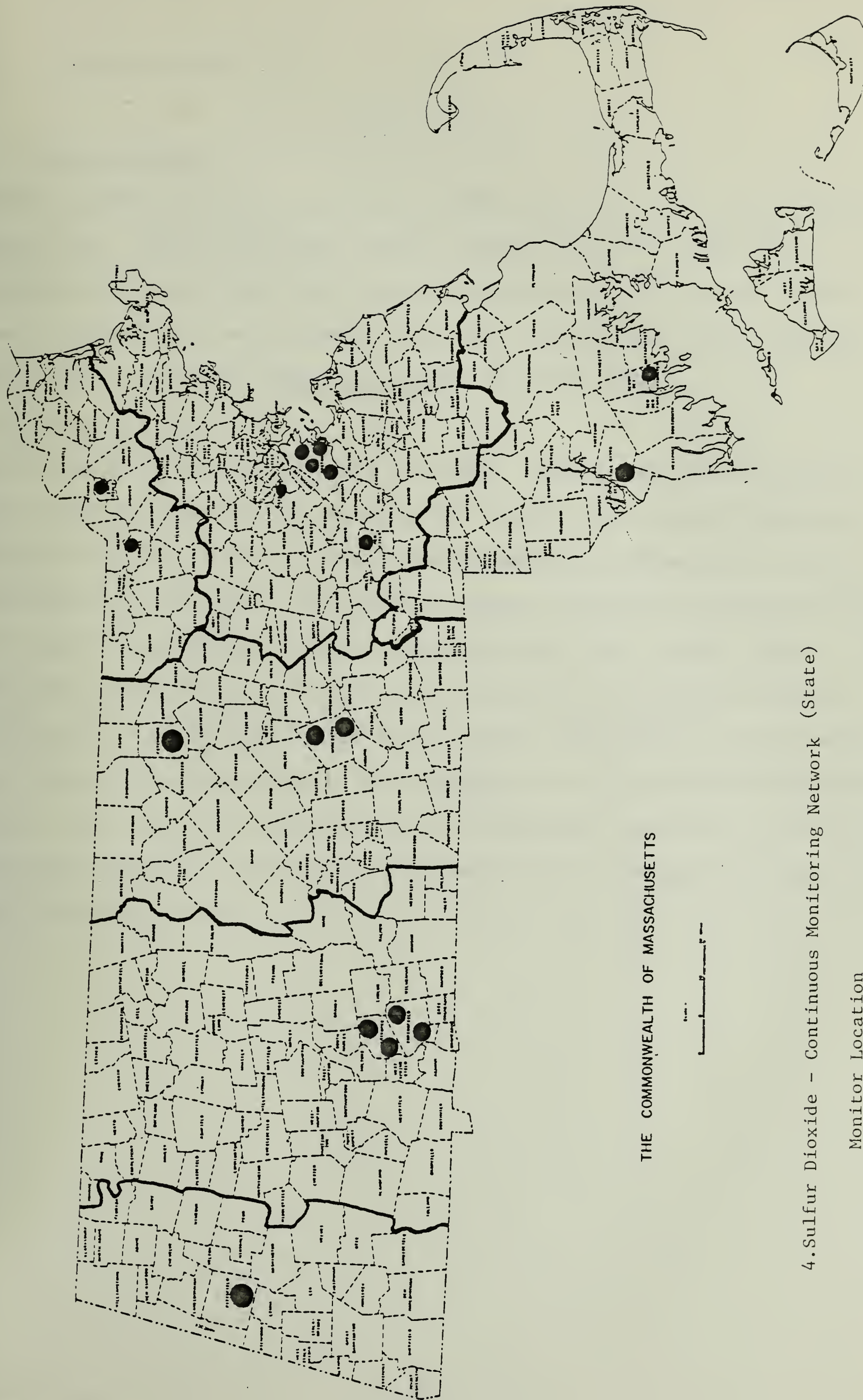
SO₂ units: ug/m

City	Saroad #	Instrument Method	Number of Hourly obs.	Annual Arithn. Mean	Max. 24 hr obs.	2nd Max 24 hr obs.	Max. 3 hr obs.	2nd Max 3 hr obs.	Max 1 hr obs.	2nd Max 1 hr obs.
BERKSHIRE AIR QUALITY CONTROL REGION (117)										
Pittsfield	1800-007	20	7444	18	94	81	209	183	259	23
CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)										
Fitchburg	0620-003	20	8415	18	131	105	210	204	262	24
Worcester	2640-019	20	7510	18	94	92	128	128	157	13
Worcester	2640-020	20	8263	18	121	118	207	202	264	13
MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)										
Lawrence	1000-005	20	7617	24	134	121	327	228	398	34
Lowell	1080-007	20	8111	18	102	97	207	183	230	22
METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)										
Boston	0240-002	20	7764	47	155	141	471	396	694	55
Boston	0240-015	20	7139	29	141	134	251	249	320	30
Boston	0240-021	20	6370	21	131	123	238	217	445	41
Boston	0240-026	20	8117	21	118	115	290	212	490	37
Medfield	1210-001	20	8518	13	79	55	152	139	390	17
Watertown	2380-005	20	7465	21	131	105	259	196	341	29
PIONEER VALLEY AIR QUALITY CONTROL REGION (042)										
Chicopee	0400-005	20	2935**	*	105	102	259	191	301	28
Chicopee	0400-008	20	4518**	*	131	102	210	183	393	21
Springfield	2160-009	20	7817	29	128	115	320	246	367	33
Springfield	2160-015	20	8360	26	191	165	272	267	301	29
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)										
Fairhaven	0570-002	20	8455	16	118	66	215	131	262	28
Fall River	0580-004	70	7287	21	170	118	361	348	524	48

* Annual Arithmetic Mean could not be determined due to insufficient sample size.

** When total observations are less than 6,250, sample size is insufficient to represent sound data results. Sulfur dioxide data are collected throughout a year; 100% data capture during this period represents 8,760 hourly observations.

FIGURE 2: CONTINUOUS AIR SAMPLING NETWORK - 1983



B. CARBON MONOXIDE (CO)

1. Sampling Method

DAQC uses non-dispersive infrared (NDIR) analyzers for carbon monoxide detection. These analyzers employ a short cell NDIR detection principle coupled with water vapor subtraction. This methodology meets equivalency requirements published by the U.S. Environmental Protection Agency in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

DAQC operated nine CO monitors in 1983. There were no violations of the one-hour standard of the National Ambient Air Quality Standards (NAAQS) for CO in 1983. The maximum hourly CO value was 21 mg/M³ at Springfield (2160-007). The Kenmore Square (0240-002) site recorded the highest eight-hour average concentrations (17 mg/M³). One exceedance and four (4) violations occurred at the Kenmore Square (0240-002), one exceedance at Essex Street (0240-022), one exceedance at Breman Street (0240-021), one exceedance at Thomas Street-Worcester (2640-020), and one exceedance and 4 violations occurred at the East Columbus Avenue in Springfield (2160-007) of the eight-hour standard were recorded in 1983.

TABLE 6

1983 CARBON MONOXIDE SUMMARY

CO Units: mg/M³

City	Saroad #	Instrument Method	Number of Hourly obs.	Max. 1 hr. obs.	2nd. Max. 1 hr.	Max. 8 hr. obs.	2nd. Max. 8 hr	# of 8 hr. averages above 10
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CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-020	11	7688	17	16	13	9	1
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MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lowell	1080-007	11	6187*	20	18	9	9	0
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

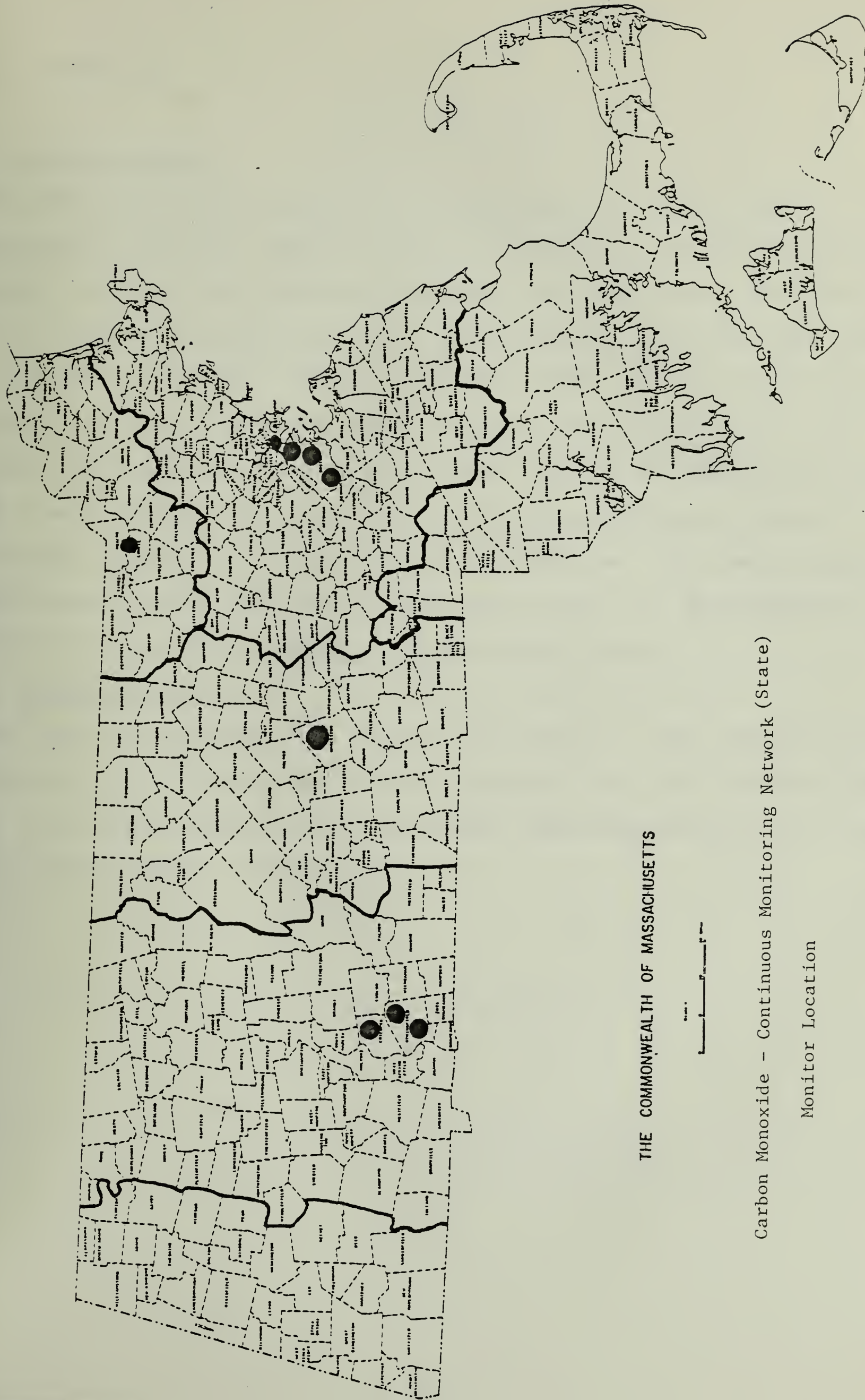
Boston	0240-002	11	7075	20	18	17	12	4
Boston	0240-015	11	6716	12	10	8	8	0
Boston	0240-021	11	8133	19	14	10	7	1
Boston	0240-022	11	7042	15	14	10	9	1

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

Cnicopee	0400-005	11	2930**	13	13	10	9	0
Springfield	2160-007	11	7385	21	17	16	12	5
Springfield	2160-014	11	5157**	9	8	6	5	0

** When total observations are less than 6,570, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site. Carbon monoxide data are collected throughout the year; 100% data capture during this period represents 8,760 hourly observations.

FIGURE 3: CONTINUOUS AIR SAMPLING NETWORK - 1983



C. OZONE (O₃)

1. Sampling Method

The chemiluminescence detection principle and the ultraviolet photometric analyzer method are used in the continuous measurement for ozone. In the chemiluminescence method, the ozone reacts chemically with ethylene gas emitting light. The intensity of the emitted light is proportional to the amount of ambient ozone. In the ultraviolet method, the ultraviolet photometer gauges ozone concentrations by measuring the attenuation of light from ozone in the adsorption cell at a wave length of 254 nanometers. The concentration of ozone is directly related to the magnitude of attenuation. This methodology meets equivalency requirements published by the U.S. Environmental Protection Agency in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

DAQC operated fourteen (14) stations for ozone in 1983. Ten stations violated the .125 parts per million standard, and every AQCR recorded at least one exceedance of the standard. The maximum ozone value was .255 ppm at Agawam (0030-003).

TABLE 7

1983 OZONE SUMMARYO₃ units = ppb

City	Saroad #	Instrument Method	# of obs.	Max. 1 hr obs.	2nd Max 1 hr obs.	3rd Max 1 hr obs.	Values > .125 measured
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BERKSHIRE AIR POLLUTION CONTROL REGION (117)

Pittsfield	1800-007	11	3395**	.180	.135	.115	2
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CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-019	11	4996	.145	.145	.132	4
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-021	11	7134	.112	.110	.100	0
Easton	0535-001	11	4321	.138	.126	.122	2
Medfield	1210-001	11	4097	.192	.177	.150	7
Sudbury	2196-001	11	4658	.205	.162	.146	10

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lawrence	1000-005	11	4147	.129	.127	.122	2
Pepperell	1792-001	11	4064	.142	.120	.117	1
Newburyport	1570-003	11	3862	.131	.123	.120	1

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

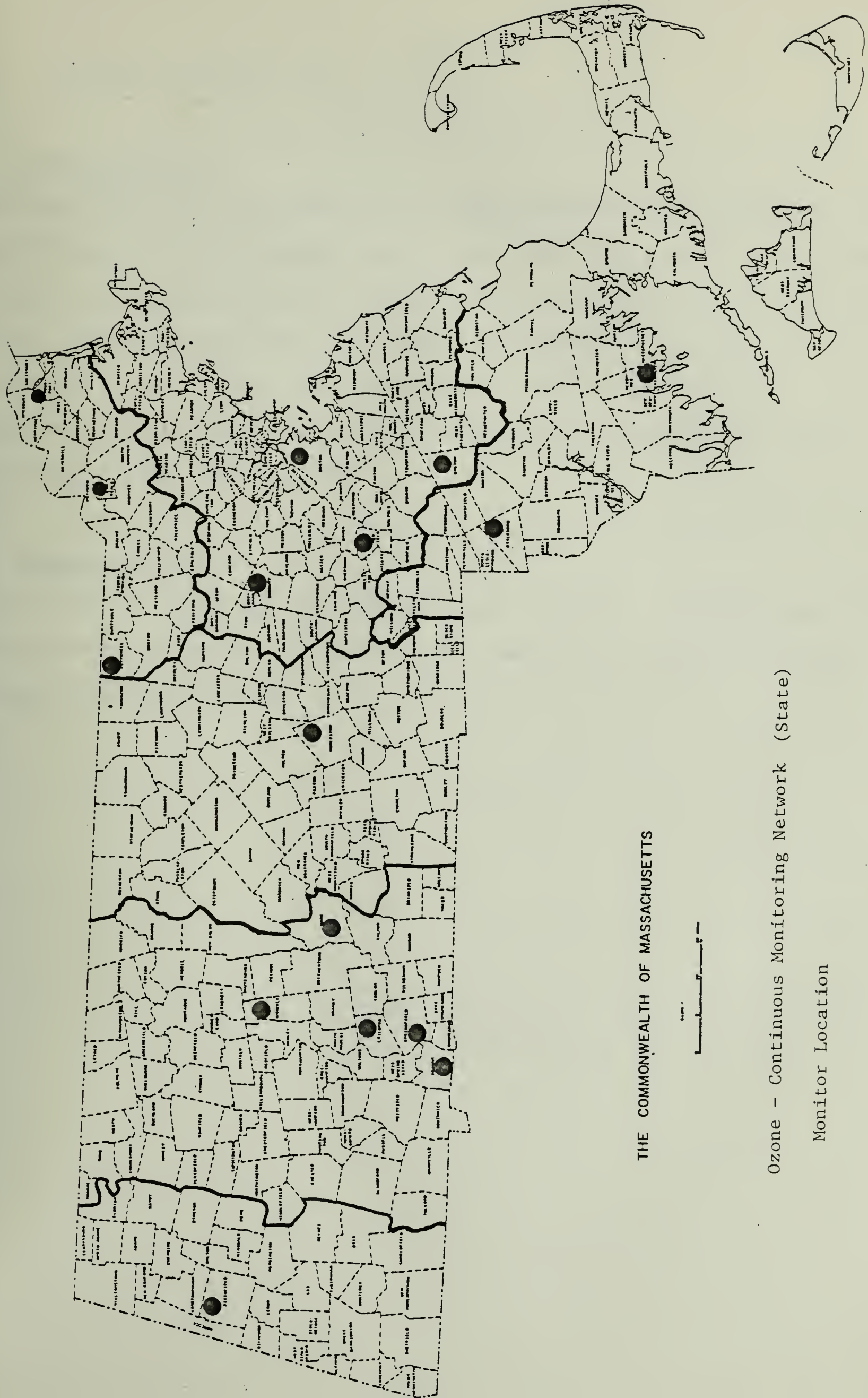
Agawam	0030-003	11	4246	.255	.185	.180	15
Amherst	0060-002	11	3769**	.160	.157	.147	8
Chicopee	0400-008	11	6082	.185	.185	.170	14
Springfield	2160-014	11	1202**	.077	.060	.040	0
Ware	2360-001	11	3658	.172	.150	.135	6

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

Attleboro	0120-004	11	3900	.133	.120	.119	1
Fairhaven	0570-002	11	4427	.198	.163	.162	17

** When total observations are less than 3,852, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site; 100% data capture during the 4/1 to 10/1 ozone season represents 5,136 observations at each monitor.

FIGURE 4: CONTINUOUS AIR SAMPLING NETWORK - 1983



THE COMMONWEALTH OF MASSACHUSETTS

Ozone - Continuous Monitoring Network (State)
Monitor Location

D. NITROGEN DIOXIDE (NO₂)

1. Sampling Method

Nitrogen dioxide is measured by the chemiluminescence detection principle. In this method, nitric oxide (NO) and oxides of nitrogen (NO_x) are reacted with ozone and the resultant chemical products emit light. The intensity of this light is proportional to the concentrations of NO₂. This methodology meets equivalency requirements published by the U.S. Environmental Protection Agency in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

DAQC operated seven NO₂ monitoring sites in 1983. In 1983, there were no recorded violations of the National Ambient Air Quality Standard (NAAQS) for NO₂ in 1983.

TABLE 8

1983 NITROGEN DIOXIDE SUMMARY

NO₂ units: ug/m³

City	Saroad #	Instrument Method	Number of Hourly obs.	Max 1 hr obs.	2nd Max 1 hour obs.	Annual Arithmetic Mean
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CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

Worcester	2640-019	14	6701	336	188	36
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MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

Lawrence	1000-005	14	6414**	210	210	*
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METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

Boston	0240-002	14	6734	301	301	51
Boston	0240-021	14	7197	312	269	47
Boston	0240-026	14	6599	286	220	28

PIONEER VALLEY AIR POLLUTION CONTROL REGION (042)

Chicopee	0400-008	14	2574**	244	226	*
Springfield	2160-015	14	7718	216	216	47

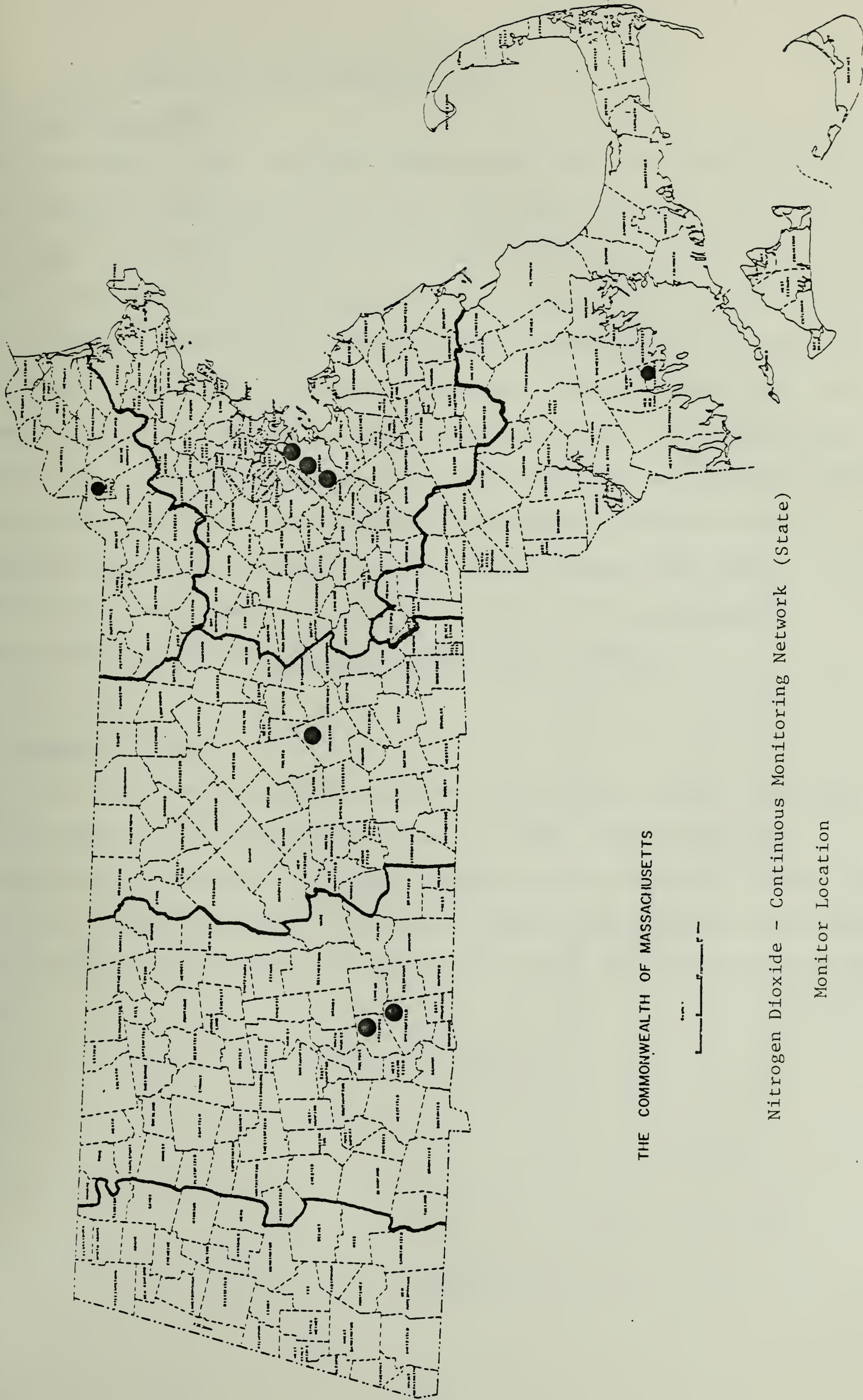
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

Fairhaven	0570-002	14	6319**	154	143	*
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* Annual Arithmetic Mean could not be determined due to insufficient sample size.

** When total observations are less than 6,570, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. Nitrogen dioxide data are collected throughout the year; 100% data capture during this period represents 8,760 hourly observations.

FIGURE 5: CONTINUOUS AIR SAMPLING NETWORK - 1983



E. TOTAL SUSPENDED PARTICULATES (TSP)

1. Sampling Method

TSP measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at the rate of 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. The difference in weight in milligrams is divided by the volume of air passed through, giving a weight per unit volume result, i.e., ug/m^3 . Upon completion of the TSP (weight/unit volume) calculation, several other physical and chemical tests can be performed upon the collected sample. This methodology meets equivalency requirements published by the U.S. Environmental Protection Agency in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

In 1983, there were 25 state-operated TSP monitors which collected 1,433 samples, one less monitor than in 1982. There were no violations of the Annual Primary Standard of the National Ambient Air Quality Standards (NAAQS) for TSP in 1983. The highest Annual Mean ($69 \text{ ug}/\text{M}^3$) occurred at the Columbus Street Fire Station in Boston Back Bay.

TABLE 9

1983 TOTAL SUSPENDED PARTICULATES SUMMARY

TSP Units: ug

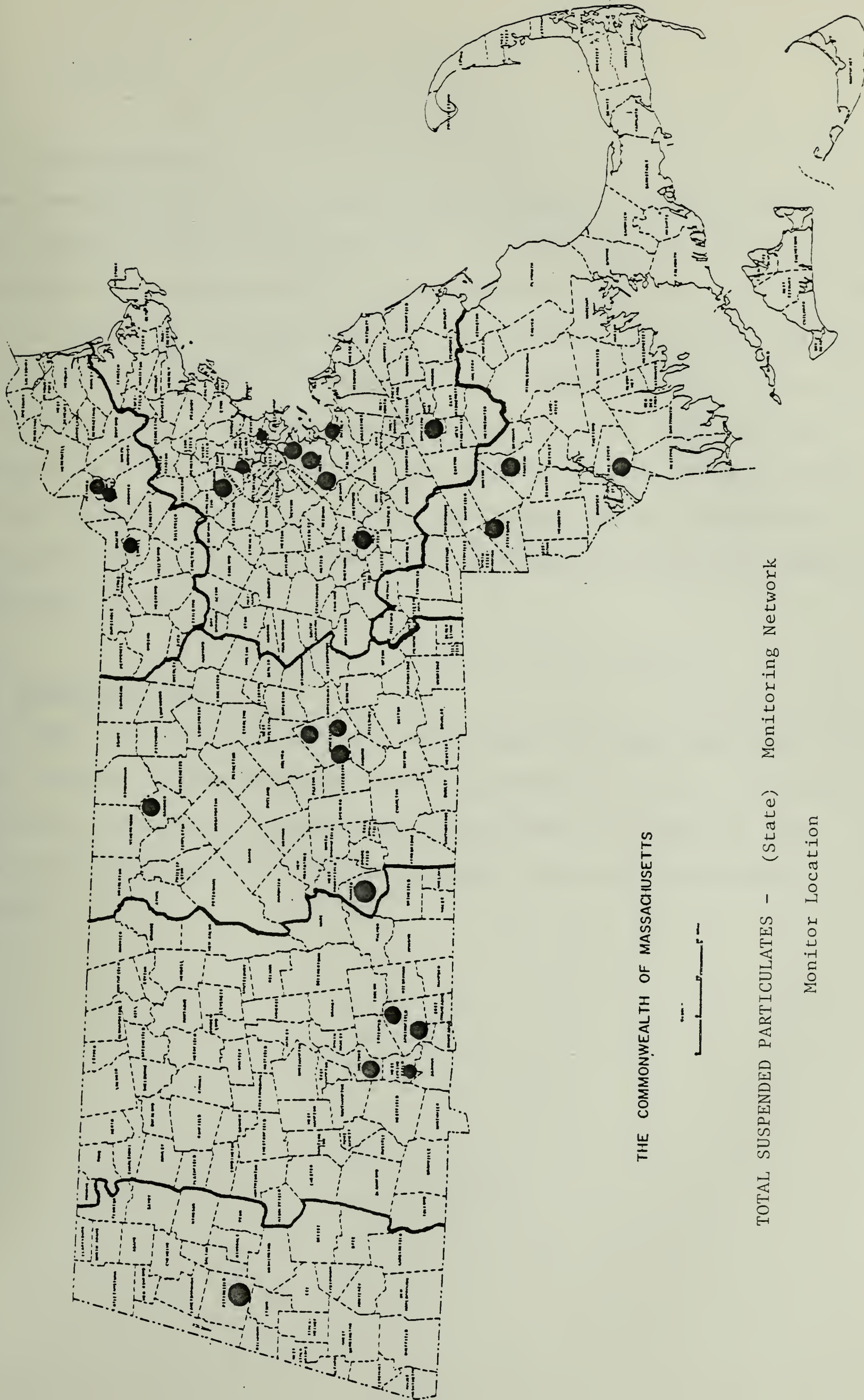
City	Saroad #	Numoer of Obs.	Minimum Obs.	1st Max Obs.	2nd Max Obs.	3rd Max Obs.	Annual Arithn. Mean	Ar Ge Me
<u>BERKSHIRE AIR QUALITY CONTROL REGION (117)</u>								
Pittsfield	1800-006	51	19	170	124	99	52	48
<u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u>								
Gardner	0720-003	7**	14	86	36	34	*	*
Warren	2372-001	54	4	93	89	54	29	26
Worcester	2640-013	48	22	84	73	70	40	38
Worcester	2640-016	125	15	146	125	114	53	49
Worcester	2640-018	34**	15	104	90	80	*	*
<u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u>								
Lawrence	1000-003	81	15	100	93	89	40	37
Lawrence	1000-005	59	14	86	84	84	41	37
Lowell	1080-006	58	9	122	120	85	43	40
<u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u>								
Boston	0240-012	140	15	138	132	126	61	57
Boston	0240-021	49	28	100	95	88	54	52
Boston	0240-024	55	36	188	146	144	75	69
Brockton	0320-003	46	18	88	73	67	40	38
Chelsea	0380-002	60	20	127	106	100	53	50
Medfield	1210-001	43	11	93	85	69	34	30
Medford	1220-002	30**	20	122	102	65	*	*
Quincy	1880-007	58	17	133	69	64	42	39
Woburn	2620-002	51	18	97	80	76	42	39
<u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u>								
Holyoke	0860-007	58	16	142	104	101	50	45
Springfield	2160-011	138	17	140	131	114	52	48
Springfield	2160-015	61	16	101	98	93	50	46
W. Sprngfld	2475-003	56	21	92	91	88	47	43
<u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)</u>								
Attleboro	0120-002	10**	3	65	57	52	*	*
Fall River	0580-001	51	13	84	81	81	47	44
Taunton	2240-001	10**	22	73	69	62	*	*

* Annual Arithmetic Mean and Annual Geometric Mean could not be determined due to insufficient sample size.

** When total observations are less than 40, the sample cannot be guaranteed to contain the actual maximum concentration value for the year.

FIGURE 6:

AIR SAMPLING NETWORK - 1983



THE COMMONWEALTH OF MASSACHUSETTS

TOTAL SUSPENDED PARTICULATES - (State) Monitoring Network
Monitor Location

F. LEAD (Pb)

1. Sampling Method

Lead measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at the rate of 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. This analysis continues with the filter cut and placed in a nitric acid bath. The solution is then passed through an atomic absorption analyzer. This methodology meets equivalency requirements published by the U.S. Environmental Protection Agency in Part 58, 40 CFR, May 10, 1979.

2. Summary of Data

In 1983, there were six state-operated lead monitors which collected 339 samples. There were no recorded exceedances of the three-month National Ambient Air Quality Standards (NAAQS) for lead in 1983. The maximum quarter occurred in Springfield (2160-007) with A-mean of .99 ug/M³.

TABLE 10

1983 LEAD SUMMARY

Pb units: ug/M³

City	#	Method	Obs.	Max	Max	Aritnmetic Mean		
	Saroad	Instrument	No.of	Obs. 1st	Obs. 2nd	1st	2nd	3rd
<u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u>								
Worcester	2640-016	92	58	.61	.58	.25	.16	.23
<u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u>								
Lowell	1080-006	92	57	1.37	.72	.37	.22	.27
<u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u>								
Boston	0240-002	92	54	.99	.89	.52	.45	.56
Chelsea	0380-002	92	56	.73	.68	.26	.23	.37
<u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u>								
Springfield	2160-007	92	55	2.07	1.45	.65	.63	.81
Springfield	2160-011	92	59	1.10	1.01	.40	.31	.41

FIGURE 7: AIR SAMPLING NETWORK - 1983

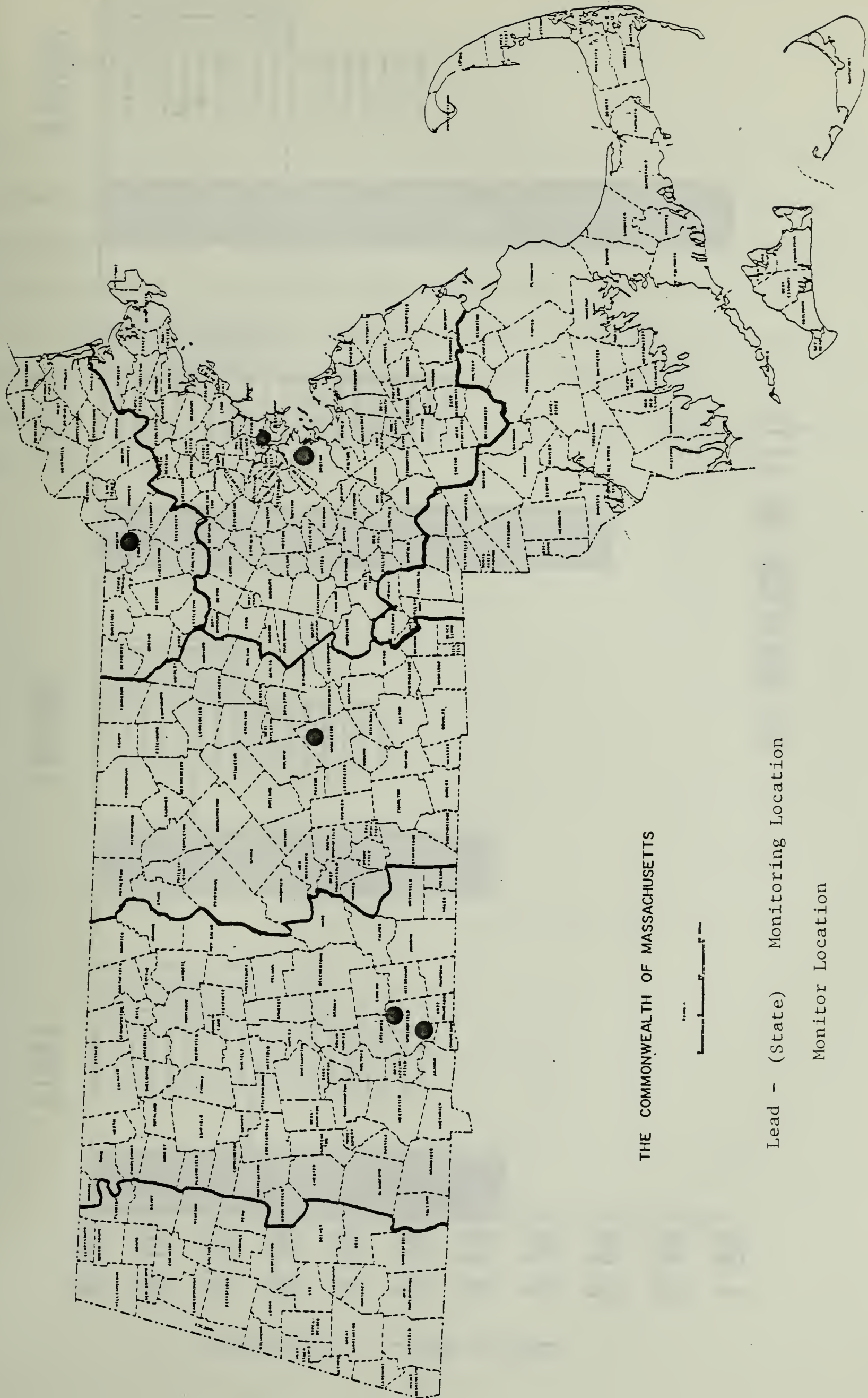
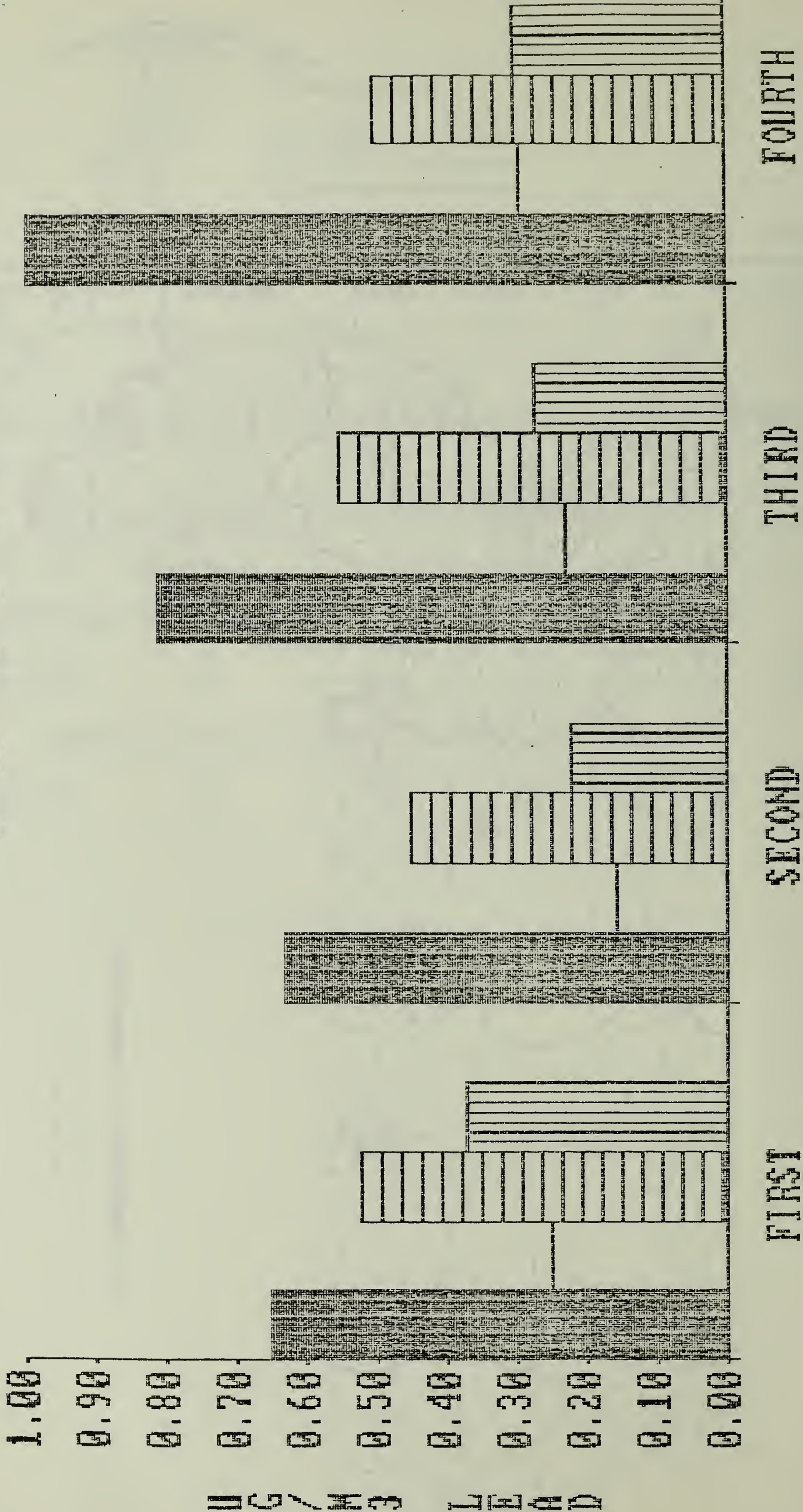


TABLE 11

FB QUARTERS BY SITE



G. POLLUTANT STANDARD INDEX (PSI)

The Pollutant Standard Index provides a simple, uniform way to report concentrations of ozone -- the predominant form of photochemical oxidants or smog. Through its statewide ozone monitoring network, DAQC evaluates the previous day's ozone level and predicts the following day's ozone concentration based on the analysis and on weather forecasts. DAQC reports ozone PSI values daily during the months of April through September for three areas: Eastern, Central, and Western Massachusetts.

TABLE 11

Index Value	PSI Descriptor	General Health Effects	Cautionary Statement
500			
	hazardous	Premature death of ill and elderly. Healthy people will experience adverse symptoms that affect their normal activity.	All persons should remain indoors, keeping windows and doors closed. All persons should minimize physical exertion and avoid traffic.
400			
	hazardous	Premature onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons.	Elderly and persons with existing respiratory diseases should stay indoors and avoid physical exertion. General population should avoid physical activity.
300			
	very unhealthful	Significant aggravation of symptoms and decreased exercised tolerance in persons with heart or lung disease with widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors and avoid physical activity.
200			
	unhealthful	Mild aggravation of symptoms in susceptible persons, with irritation symptoms in the healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity.
100			
	moderate		
50			
	good		
0			

1983 POLLUTANT STANDARD INDEX

		<u>EASTERN</u>	<u>CENTRAL</u>	<u>WESTERN</u>
APRIL	Good	22	22	16
	Moderate	8	8	13
	Unhealthful	0	0	1
	Very Unhealthful	0	0	0
MAY	Good	13	23	13
	Moderate	18	8	18
	Unhealthful	0	0	0
	Very Unhealthful	0	0	0
JUNE	Good	2	10	2
	Moderate	18	19	19
	Unhealthful	9	1	9
	Very Unhealthful	1	0	0
JULY	Good	1	14	2
	Moderate	22	16	21
	Unhealthful	8	1	7
	Very Unhealthful	0	0	1
AUGUST	Good	8	11	7
	Moderate	20	18	20
	Unhealthful	3	2	4
	Very Unhealthful	0	0	0
SEPTEMBER	Good	11	18	13
	Moderate	12	11	15
	Unhealthful	7	1	2
	Very Unhealthful	0	0	0

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